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PRIVATE RESIDENTIAL HOUSE PROGRAM AND PUBLIC WORKS IN HUNGARY

Magyar Epitoipar [Hungarian Building Industry], No 8, 1955, Budapest, Pages 362-370

Victor Hergar

The private residential house program differs from the already discussed lot acquisition of similar aim. The difference is mainly manifested in that it goes beyond the simple acquisition of lot for house construction and is primarily concerned with serious construction intention. Contrary to similar ordinances this one gives a short deadline for project completion of 2 years (1). This short deadline which only extends over 2 building seasons brings to the attention of the users of this program that they should only take advantage of the possibilities offered by the ordinance if they possess the tools to really build their own home in such a short period. Another difference shows itself in an attempt to choose much more carefully the lot where the house is to be built and to assure that it blends with the rest of the development. What is even more, the ordinance goes further than any others and declares that land which is equipped with public works should be utilized.

These changes will now make it possible to better exploit the possibilities which will arise as a result of providing dwellings with public utilities within the frame work of the private residential house program. It is obvious that it is much more simple and economical to provide dwellings with public utilities at a location where one can count on the early construction of the individual groups of houses instead of where only a few components of the group are scattered according to no particular plan. Not even to mention the good fortune of the building lot being allocated to the private residential house program where public works already exist or where it can be connected to already existing systems or where the installation of public utilities is a financial or legal question rather than a technical one.

The time needed to redeem the sum invested in the creation of public utilities and the extent of the use of the investment has a significantly more favorable development on lots which are almost completely built up, than where one can count only on the partially built up ones. We consider it important, in order to direct the discussion in the correct channels to establish what type of public works can be considered for the private residential house program. The question of choosing a goal out of proportion with the People's economy requires particular attention. A great advantage from this point of view would be the following: within the frame of the suggested plan for water management one would already be equipped with a long range plan for water supply and up to a point for sewerage (2). The plan (to run for 20 to 25 years) directs the construction of the following on a general scale: aside from the modernization of the 87 existing water works, the construction of new central water works in 58 more important settlements with a population of over 190,000, the enlargement of 164 small water works, the construction of 86 new small water works and the construction of 7,000 new public wells. This will mean that approximately 50% of the nation will be centrally served which approximately doubles the current figure (3). At the same time the plan directs the construction of 73 sewerage purification plants and also includes the modernization of existing unsatisfactory purification plants. When examining the pipeline system the fact that out of our 62 towns only 30 are equipped with sewerage pipe lines and that the length of the pipe line system only represents 57% of the water pipe line system, has to be kept in mind.

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All this points to the fact that the population which will be supplied in the future through a public works pipeline system will only represent about two-thirds of the population being supplied by the water works.

Unfortunately, there is no plan for supplying the country with electric power similar to the water management plan. So that the electrification of the "private house construction program" has to be solved on the basis of individual cases.

Fortunately the electric power supply is much more wide spread and its tempo faster than the development of other public works, so that only in exceptional cases will unavoidable obstacles be placed in the way of supplying electricity to the housing areas.

On the basis of these ideas the realization of the following public works can be considered for the areas of the "private house development program":

1. The provision of electric power.

2. Water supply.

3. Rain water drainage.

4. Sewerage handling and drainage.

Among the actual public utilities enumerated above, the provision of the dwelling areas with communications facilities also has to be considered. These are restricted almost exclusively to automobile road and side walk construction.

Due to the limited capacity of the people's economy it is often not possible and not even desirable to build the total summarized projects as public works. Often we will be forced due to reasons of economy or technology to solve questions on a level lower than public works. There are only 2 instances which cannot be solved individually. These are rain water drainage and electric power supply. These problems demand collective solutions in every case. Between the 2, however, the significant difference is that in final analysis electrification can be eliminated, but we can never do without a solution for rain water drainage. However, since the rain water drainage of housing developments with one-story houses takes place almost exclusively in roadside ditches the problem of rain water drainage cannot be separated from the development of the road. What is more, the sectional arrangement ofaall the public utilities is coordinated by the development of the road. The projects being discussed complement one another, and if allowed to stand alone are incomplete so that there would be no point to prepare a priority system for them. From a planning point of view the basic priority of road construction planning must be lifted out since it acts as a coordinating factor for the placing of the other public works.

Aside from those public works already discussed another can be mentioned in certain cases. This is the gas works service which can be piped to new housing developments in those towns and villages where gas service already exists.

It is worthy of mention that in Zala megye there are already 17 villages which have gas supply service.

For the time being the ordinance concerning private house building does not regulate the question of supplying public works. It is possible that

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there may be local councils which, due to the lack of a public works plan on a national scale, will solve the question of collective public works supply without the direction of the higher authorities. It is likely, however, that the majority of the localities will have no advice on this problem, that in some places they will not be able to solve the problem at all or will try to solve it incorrectly. All this points to the fact that local councils must be supported in the interest of the construction of collective spirited public works, for the "private house development program" project (which is otherwise well prepared from the financial and above-ground construction point of view) by the publication of directional ideas on a national scale.

The following are some of the important problems concerning the unified regulation of public works which have to be solved: the planning of the public works, the realization of the plans, assumption of the cost, or in the case of need the assumption of the total or partial financial burden. In certain cases one also has to provide for the upkeep of the already completed installation, as well as to assure the continued working and the absorption of the running costs of the installation. It can be suggested that perhaps it looked as if certain public works already in existence such as for instance, water pipelines, gas and electric power supply, do not have to be separately adjusted to the special circumstances of the "private house development program since these public works have developed a practice for the handling of similar cases. We still maintain the need for planning -- particularly with respect for what will be discussed later -- for the organizing of the mentioned problems on an individual and nationwide scale, for the elimination of uncertainties and in part to advance qualitatively the level of the "private house construction program" and last but not least to provide economic and modern basic necessities for the satisfaction of the tens of thousands participating in the "private house construction program".

Aside from the already discussed harmonious management of the legal and financial parts of providing public utilities there also exist various types of technical conditions. Such, for instance, is satisfactory space allocation which decisively influences the economical creation of public works. For space allocation the experts of the public works have to be drawn upon.

Another very serious problem is the size, and principally the shape of the lots. According to the ordinance (paragraph 1), 100 to 400 square fathom lots -- that is 360 to 1,440 square meters -- can be distributed. This means that the net population density of a group of lots to be developed may vary between 120 and 125 persons per hectare. Unfortunately, considering a population density of 25 persons per hectare in connection with 400 square fathom lots, the expected 5-6 meter length of public works per person would mean such a burden which could not now or in the foreseeable future be assumed either by the builders or by the people's economy. However, in the case of small lots, public works of 1.5-2 meter length per person in connection with a population density of 80-100 persons per hectare would represent a bearable expenditure. From this point of view the street frontage of the lots being developed would have decisive meaning. The most suitable type of construction for lowering the cost of public works in the event one story houses are constructed are row houses where with a properly developed settlement plan one meter per person can be reached. That is why it would be advisable to pay particular attention to this most favorable building method in connection with the "private house development program" in towns.

Considering the building plans which are placed at the disposal of the builder the most practical from the point of view of installing public utilities are those which permit later installation of public utilities with the least amount of conversion since they do not cut off the gradually expanding

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construction of public utilities. As I already developed in my earlier study (14) the greatest obstacle in the gradual improvement of our existing dwellings by making public utilities available is caused by their unsuitable foundation drawings, and as result, comfortable apartments can only be developed at a great conversion expense.

On the land chosen for the site of the development not only such factors as the contours of the land, ground and ground-water have to be measured, but it must also be examined from the point of view of connecting with existing public utilities and the possibility of building new ones. The selection of lot not only decides the conditions necessary for the technical realization and the economy of public utilities but through this in the last analysis basically establishes the fact whether it is possible to provide public utilities. Even in the severest cases it is possible to find a technical solution. The only question is the cost of this solution.

If the expenses are over a bearable point then plainly the technical solutions cannot be realized. That is why the provisions of the ordinance (paragraph 1) -- according to which ground has to be chosen in accordance with the regulations in the event of the absence of a town plan -- has such importance. It must be emphasized, however, at the time of site choosing that the opinion of the public works or planners public works must be consulted. It would be undoubtedly necessary to settle how much the bearable costs would be. It is obvious that only the responsible organs of the people's economy can answer this question. Due to the lack of this we give our opinion for informational purposes which is that on the average the entire expense of public works construction should not exceed 10% of the cost of above-ground building.

The economy of providing public works is first decided as we have already mentioned at the time of site choosing; however, its further future depends largely on the suitable development of the lot dividing plan.

We have already discussed the basic influence of the size of the lots to be distributed as well as the decisive influence of minimum lot frontage. After this we only want to remember the related influence of the road building and lot dividing plans. The question presents itself particularly strongly in hilly and sharply declining changeable terrain.

Generally speaking-with notable exceptions-the situation is as follows: After the lot dividing plan has been completed the road construction plan is prepared when it becomes apparent that this can either be done only with very great difficulties or not at all. There is trouble with the long profile with inclines, the radii of the curves, with the width of the road (principally in cuts and fills); if the slope falls on private land, it becomes an open question who will build the fence and who will provide the maintenance. Access to dwellings is gained by stairs and expensive prop walls have to be built.

The correct procedure for such cases is that the road plan and the lot dividing plan be prepared simultaneously and that the 2 planners formulate their plans after numerous discussions. This system worked perfectly for the private house development plan for miners at the Salgotarjan, Varpalota and Perece developments.

The placement of the public works as related to one another -- as was mentioned before -- is coordinated by the road. The correct development of the road system at the same time determines the correct placement of other public works.

Thus for instance the road side ditches serve for the drainage of rain water; poles for carrying electric wires can be set up on bench shaped constructions or next to the side walk and if sewerage pipelines are built, they can be put under the center of the road. In the event that the ground is flat the public water pipeline is put on the sunnier side of the street under the side walk or under the grassy strip next to the side walk, and the gas pipes would be placed on the opposite side. When constructing the road system in a development of one story houses with a low density of population and the overwhelming number of the streets are residential with only an occasional one becoming a collecting street -- as it will be seen later -- a side walk on one side of the street is ample to support the pedestrian traffic which will develop. Therefore one must courageously break with the traditional symmetrical road arrangement and in its place construct the more suitable asymmetrical and cheaper road profile.

Electric Power Service

It is foreseeable that in the one-story housing areas electric power service will be one of the most wide spread of public utilities. The solution of supplying electricity looks relatively simple. It is worthwhile, however, to examine the expected consumption a little more closely. The basis for establishing the consumption of the net works is the synchronized electric power linkage rate dwelling. Based on experience the rate is as follows: In rural towns 200 w per dwelling and 150 w per dwelling in villages. Public lighting, however, also has to be added. In calculating the linkage rate we assumed that we would be satisfied with direction lighting in village developments with one 40 w electric bulb on every other pole. If calculated in road center kilometers this means a 600 w linkage rage per km. In urban developments, however, we desire more satisfactory lighting. This means that we take one 100 w electric bulb on each pole as the basis for calculations which equals 3,000 w linkage rate per km.

On the basis of the assumed starting figures we have examined the changing linkage rate in connection with the density of population. (See Table, 1, figure 1, appended).

The connection deduced plainly shows the development of electricity linkage rates of the rural and urban settlements. While the linkage rate for one dwelling decreases with the diminishing density of population, at the same time the linkage rate per one hectare naturally grows as a result of increased consumption. The proportionate percentage of street and apartment lighting shows a tendency to decline with the growth of net population density. All these figures prove the greater economy of a heavier density of population from the point of view of the electric power supply as well.

The linkage rate serving as a basis for a network consumption gauge for a 100-dwelling development varies approximately between 16 and 23 kw. This, however, is such a low rate that one pole transformer could easily take care of the supply. Unfortunately, however, this would only be possible with a density of population of 80 to 100 since the burdened distribution network can only be placed economically (with the permissible 3% falling off of tension) from the transformers whereas with a net density of population of 25 individuals per hectare, the extent of the road system can be estimated at 2,860 m in which case more than one transformer would be necessary with one barely carrying a load of 5 to 10 kw.

The few data presented here are perhaps sufficient to show that supplying electricity to such a small settlement is a question which must be taken into consideration and one which must be solved. In the course of planning, the space requirements of the pole transformer stations definitely have to be

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taken into consideration. And, if possible, the direction line of the rows of poles has to be so arranged that it can serve to support the lamps for the public lighting system as well. Particular attention has to be paid to see that the branches of the trees do not obscure the public lighting, an instance for which there are unfortunately numerous bad examples. This is particularly important in cases of one-story building construction since it would be too expensive to provide public lighting in the center of the residential streets and public lighting has to be attached to the rows of poles running along one side of the street.

Water Supply

The basic need for water in housing developments has to be solved at all costs -- if possible, on the level of public works, if not, on a lower level, but without satisfying the need for water even a beautifully planned development remains worthless.

The question of satisfying the demand for water in connection with the "private house development program" can be sharply divided in two parts. In developments where the lots also serve for farming in the vicinity of the houses or in other words are for peasants and have the characteristics of large developments, that is long lot frontage and low density of population, public works-type water supply is of doubtful economy. At such places drinking wells have to be created for the individual lots or one well for neighboring lots. However, if the ground water is polluted or is easily pollutable public well stems have to be constructed.

With industrial or office workers one does not have to worry about neighborhood farming and so it becomes possible to attain greater population density and smaller lot frontage because of the smaller lots. In such cases the solution of water supply by means of public-works steps into the foreground.

The amount of water needed per person always depends on the method of water supply. In the case of a more convenient mode of supply more water is used than when obtaining water means expending energy. In one-story housing developments the daily per capita consumption is 40 to 100 liters depending on whether there is a system of public wells or water is piped into the houses. If we take 400 as the maximum inhabitants for a 100-lots then the necessary amount of water may vary between 16 and 40 cubic meters per lot. This amount of water can be supplied by any medium-sized urban public water works without difficulty. In the event of linkage to a small water works, one would have to consider enlarging the works. Still greater difficulty presents itself if we are forced to independent water supply.

A public well can supply the population within a radius of 200 m. In a 100-dwelling village housing development, depending on the configuration of the development one to 4 wells would be needed. For such water supply shaft wells are perfectly suitable. According to the MNOSZ 15, 356-53 R. sz. which has a series of plans for its construction wells yielding 15 to 20 liters per minute are necessary. However, if there is no protected upper layer of water and one has to count with the possibility that the water will be polluted, deeper (artesian) bored wells have to be created. Today when constructing such wells, one must no longer absolutely strive for spouting water, since we can only count on it coming from the deeper strata and we must rather use the first protected stratum of water. According to Demokos Hunyady (8) the expense of constructing such a well only amounts to one half or one third of the money needed to construct a well of great depth. If we are nevertheless forced to bore a well for obtaining spouting water we can then pipe it to several public wells from the main well.

In the event that obtaining water is extremely difficult when for instance only deep bored water is available there is no other way for securing an independent water supply than to build a small water-works. Before a small water-works is constructed the immediate surroundings of the development have to be thoroughly examined for their water supply situation. This is particularly true of the central part of the development, therefore one must strive to satisfy as many needs as possible since thus the water-works becomes much more economical.

While speaking of small water-works it should be mentioned that we can never expect them to develop sufficient pressure for this water supply system for fire fighting.

The fire fighting of such small developments has to be brought into harmony in a manner satisfactory to that of the whole town or township. In the event that a central water works is available the necessary fire plugs will have to be installed. In the event that the above is lacking, fire fighting water has to be provided within reach of attachable hoses. According to the instructions of the applicable fire fighting ordinance for housing areas of machine stations, for every 20,000 air cube meters of modern fire proof dwellings 50 cubic meters of fire fighting water has to be held in readiness. As we have already mentioned in the private house development program one cannot count on more than a 100 to 120 houses in a group at a time. If, for a 2-room dwelling we count an average of 300 air cubic meters then on the entire development there will be, at the most 36,000 air cubic meters of dwelling houses so that approximately 100 cubic meters of water for fire fighting will have to be stored. However, the regulations for the buildings of machine stations do not yet affect the area of developments, nevertheless its observance from a fire fighting point of view would be desirable. However, one should remember that, if possible, one should remain in balance with the fire safety conditions of the parent settlement.

In the event that a small constant flow of water crosses the development to be built, the cheapest and, at the same time, attractive method of fire fighting water storage is to widen the flow and create an artificial storage place. This will solve the problem economically (15).

Rain Water Drainage

The drainage of rain water -- as we have previously developed -- cannot be solved individually taking into consideration the question of lots. The amount of precipitation on an area is determined by the amount of downpour, the area to be freed from the water and the drainage factor. Examining the amount of down pour, we see that MNOSZ regulation 15,300-53 offers reassuring statistics for almost the entire country. To determine the size of the area, particularly areas built up with one-story family houses with gardens, the dwellings and yards should be taken into consideration, thus excluding the gardens. Steep hillsides form an exception since precipitation water will definitely flow into the street. The listed regulation again offers clarification for the factors of downhill drainage. No matter how small the area is that we are trying to make free of water aside from establishing the quantity of water to be drained, we must always reassuringly establish where and in what type of receptable to lead this water and to see whether the chosen receptacle is sufficiently large to absorb the drainage water. This question is often carelessly handled. They are satisfied with channelling the water into some existing ditch but whether or not this ditch can carry the extra water away is a question which is no longer examined. In the interest of making roads and particularly motor roads free of water, we generally develop water drainage ditches as road ditches. This does not mean that we should not examine the absorption capacity of the regular road ditch. It is possible that the absorption capacity of the regulation road ditches is not sufficient. In such cases ditches of more generous proportions have to be created.

The greatest enemy of the absorption capacity of road side ditches is irregular-sized piping under road turn-ins. The solution of this problem is not easy since aside from problems of hydrography it also presents problems in communications and aesthtics. (We will return to these later in the chapter on communications.)

The water assimilating capacity of the gutters under the road turn-ins have to be established in harmony with that of the ditches, or in other words the diameter and the pipes have to be prescribed which is a simple planning project. A more difficult task, however, is the supervision of the project particularly if a number of turn-ins is being constructed at the same time. This, however, would be the task of the technical supervisors of the local council.

Sewage Drainage -- Sewage Handling

The soil is capable of causing the decomposition of a certain amount of organic matter in natural ways, but it cannot regularly absorb sewage in concentrated quantities. Thus the self cleansing quality of the soil is limited and can only be counted on in widely-spread small individual farms.

The density of developments of family houses with gardens is at such a stage of development that the self-cleansing quality of the soil is no longer sufficient. Pollution through the soil is not dangerous beyond a certain distance and it depends on the type of soil. This distance is approximately between 10-20 meters; in other words, the wells have to be placed at least at this distance from the nearest toilet, pigsties and manure piles. Unfortunately, due to the narrowness of the lots even this distance is hard to obtain on one's own lot, but if we consider the similar constructions of the neighbors, it becomes even harder. The placing of wells is especially difficult if the ground water has a flow in a particular direction. In such cases it is easy to get the pollution from a neighbor on the side from which the flow comes.

The danger from pollution is increased if the drinking water comes from the upper layer of the water which does not have a water tight clay layer above it, since pollution on the ground or -- the pollution that has entered the ground -- can get directly to the water supply. Therefore, aside from the already mentioned safe distance, the second safety measure is as follows: water should be taken from a well which gets its supply from under a connected and sufficiently thick layer of clay which definitely can keep out sewage seepage from above.

If we have piped water into the house with a toilet and bathroom, then neutralization of sewage causes a problem. One can count on public street sewage in towns and townships only.

In such places where there is porous sand and the sandy clay and ground water lie comparatively deeply, the drying of sewage waters is generally the cheapest individual solution.

Such fittings are usually composed of 2 parts: a sedimentation device and the actual dryer which can be a draining well, subterranean drain pipes or a drying ditch. Such an arrangement will fit the lot and its upkeep consists of a biannual cleaning of the sedimentation device.

According to the numerous plans prepared this year for the drying of sewage of machine stations similar drying solutions as above were estimated to have an equivalent value of 1,200 to 1,400 forints. In favorable cases this decreases to 920 forints per dwelling unit.

Such favorable conditions, however, do not present themselves everywhere. If for instance we have black "greasy" clay soil and ground water rises, the use of the drying substance cannot be counted on.

We can best free ourselves of sewage by banding together, but only if there is a flow of water into which the cleansed sewage can be channeled. The substance of group sewage drainage is to lead the sewage collected in dwellings through closed pipes to a communal cleansing pool where it is purified and, subsequently, channel the purified sewage into a suitable flow of water. The solution of the technical problem of handling and connecting group sewage drainage to existing public utilities is definitely limited by the need for economy. In our opinion it would not be economical to go above the expenditure of 1,500 forints per inhabitant at this time. In this case one will have to do without the public utility and build toilets with cesspools.

Transportation

Perhaps at first it seems an exaggeration to speak independently of the transportation problem of a housing area of a 100 to 120 one-story dwelling, particularly if the area is an organic part of a larger township or town. It is undeniable that the transportation of such a comparatively unimportant area cannot be compared with the transportation situations of whole villages or towns. Comparatively much has already been said about the traffic road net, the through traffic and the main roads of settlements. Unfortunately, however, no one has examined the traffic and transportation circumstances of the least important residential streets. It would perhaps be worthwhile to examine this a little more closely. Particularly to ascertain whether there is need for road and side walk surfacing and if so to what extent; namely, because road surfacing when compared to public works systems is the most expensive. In order to determine the traffic of residential streets let us assume that a street with a population density of Sn = 100 persons per hectare is 400 m long which is generally the great length allowed. With these assumptions we can count on a population density of 280 in a residential street. If we accept the basic premise (checked several times) of Thomas Muranyi according to which the total yearly trips taken by one inhabitant is 1,020 per person per year, then the inhabitants of the residential street will take 285,000 trips of some kind per year. In residential streets such trips almost always start with walking even if the trip is continued or begun by some means of mass transportation (such as bus or street car) since the stops of these means of transportation are seldom located in residential streets.

Exceptions to this rule occur when the person leaves his residence by means of his own mode of transportation. Usually this will be a bicycle or motorcycle. The automobile hardly enters the picture with the present supply, but even in the future density of motor traffic it will not be too numerous. According to the figures of Muranyi, motor traffic density will develop in rural towns to one motor vehicle for 15 inhabitants, and in villages to one vehicle for 87 inhabitants out of which 50 percent will be motorcycles and 33 percent automobiles. However, there are no figures showing what percentage of these will be privately owned, and at the same

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time in garages on private lots since only these can start from residential streets, otherwise the trip will still begin with walking. Due to uncertain figures we will depend on current experiences and leave out the first in the examination of traffic on residential streets.

We get more interesting figures if we examine bicycle traffic. According to the study quoted from the yearly 1,020 trips, artificial means of transportation are used for 340 trips of which 55 percent are by bicycle. According to our example the number of bicycle trips are 280x0.55x340 which equals 53,400 travels per year. If we deduct this figure from the total number of trips we find that trips commenced by walking equal 233,200 per year. From these initial figures we can obtain the data of Table No 2. [see appended figure].

The results thus obtained agree fairly well with the theory according to which the rush hour in a residential street occurs in the morning when the residents leave for work. If using the index figure in the O.T., one must count on 150 workers from 100 dwellings (400 inhabitants), then out of 280 inhabitants 105 would go to work. However, since this traffic occurs in half an hour, theoretically the peak traffic per hour would be 210 trips which agrees with the 220 total trips.

On the basis of actual pedestrian traffic counts (6) a 0.75 m wide side walk track can let 600 to 700 persons pass per hour. According to this one double-tracked side walk in residential streets for the purpose of passing and avoiding other pedestrians is ample. Then if we construct the surface of the side walk to a width of 1.60 m which is adequate for 2 bicycle tracks and efficiently permits the bicyclist to share the surface with the pedestrian the bicycle traffic of the residential streets can also be accommodated. The transportation regulations (KRESZ, article 65, paragraph 1) make this possible.

Aside from the pedestrian traffic of residential streets let us also examine its expected freight traffic. In their study, professors Giese and Risch entitled Linienfuehrungen estimate urban freight traffic under light traffic conditions at one to 2 tons per year per inhabitant, and with medium traffic at 4 to 5 tons per year per inhabitant. If we take 2 tons per inhabitant per year as the amount of merchandise transported in one-story housing developments, then in the streets mentioned in our example the merchandise transported would be 560 tons.

This is such low traffic that the daily peak would not consist of more than one or 2 truck loads so that surfacing the residential street for this reason would not be economical.

The situation, however, is different if the street contains lots suitable for local farming; the traffic picture changes completely in this event. Even pedestrian traffic does not develop in the same manner as in houses where there are no animals kept. 30 to 40 percent of short trips are accomplished by wagon. That means approximately 120 wagon trips per inhabitant per year are taken. However, in a 400 m long residential street there are at the most 50 dwellings so that the number of the inhabitants is 200. The number of yearly wagon trips is then 24,000. If we figure an average of 1.5 heads per trip this will mean 16,000 team trips per year or a daily average of 53 team trips with the daily peak at 80 team trips.

One can already see from these guess work appraisals that sharp differences have to be made from the point of view of traffic between village peasant houses and ones equipped for and settled with town or industrial populations.

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The traffic analysis of residential streets would not be complete if we only examined the traffic of the finished product. We often hear such generalized arguments that the greatest need for surfacing on a road exists when the houses are being built since it is then that there is the greatest amount of transporting. Let us then examine the question to see whether or not it is economical in a one-story building residential street to surface the road prior to the beginning of construction. In the 400 m long street taken as an example there are 70 dwellings. If we take the average house as taking up 300 air cubic meters, the necessary construction material that would have to be transported for the construction of one house will come to exactly 100 tons. This makes necessary to transport exactly 7,000 tons of construction material for the whole street. If there is no stone surfaced road in the residential street -- according to the detailed cost analysis -- the transportation will cost 20 to 30 fillers less than if the road surface had been built before building operations had begun. In our opinion there can be no question that in order to save 1,400 to 2,100 forints in transportation costs it would be worthwhile to build 1,200 to 1,400 square meters of road surfacing. Obviously it would not be economical.

The above analysis points to the fact that transportation of one-story housing developments is substantially different in areas of village population from areas of urban or industrial population. The expected vehicle traffic of peasant houses will be many times greater than that of settlements which do not have animals and neighborhood farming. Therefore, in the course of building lot distribution for village or agrarian type urban population some provisions have to be made for providing surfacing even for residential streets.

The maximal daily traffic, however, is not so great as to make stone surfacing an absolutely necessity. In many cases the repaired dirt road will probably be satisfactory. When there is clay soil only the cut has to be developed and effective drainage installed. As far as it can be predicted, stone surfaces will only have to be built if the soil is of heavy clay. The customary macadamized road prepared from crushed stone would not be necessary. In the overwhelming number of cases road beds prepared from ditch-gravel, slag, or crushed stones from quarries.

In settlements of an agricultural character it will be difficult to change the development of road profiles from the usual symmetrical arrangement. Therefore, it is doubtful that the theory of building a side walk on only one side of the road can be made acceptable although -- as we have seen -- there is no need for this. The wagon road plays a decisive part in the development of the road system. In our opinion if cheaper surfacing is used it should at least be double-tracked -- that is a minimum of 5 m. With more expensive surfacing single track is sufficient, but strong shoulders have to be built for passing and avoiding traffic. We protect ourselves against the dustiness of the road by using ample short vegetation. A separate problem for houses equipped for maintaining animals is the bridging of the road drainage ditches under the turn-ins. In the solution of this problem aside from economy it is wise to take into consideration the demands of the locally developed customs and aesthetics.

In the one-story housing developments to be built for urban populations one can courageously deviate from the traditional symmetry particularly since it is also possible to avoid surfacing the roads and only adequately drained and repaired double tracked dirt roads are absolutely necessary. Here a completely free hand has to be given to the planners to enable them to develop a road system which is most suitable to the local conditions. Here too the 2 main considerations should be the generous use of short vegetation to control the dust, and effective drainage. The road system

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in the first place coordinates the correct construction of all the public works or in other words marks out the most suitable strip to be used.

From the detailed discussions above it becomes apparent that serious preparation and professional knowledge is necessary in order to provide public works for the private house development program and one-story housing developments and to solve these questions correctly; no matter how inconsequential the supplying of public works to such settlements may seem, it requires technically correct and at the same time economical solutions. Particularly important for correct development is a thorough survey and perfect knowledge of local conditions. It is just because of the apparent simplicity of the question that many persons are prone to generalize whereas there can hardly be found a task which local conditions make as individual as supplying one-story family houses with public utilities.

The correct solution in this field is even more difficult if one or the other of the demands cannot be met by public works or if one has to be satisfied with a solution on a lower level. The partial solution of water supply or sewage disposal can for instance be like this. If for some reason a solution by public works is not possible then out of the single technical and financial problem of the development there will develop approximately 100 which all have to be solved separately. None of our planning or executive firms are organizationally suitable to solve such a pile of small problems today. The solution is best found by supplying the suitable, centrally located rural councils with a free technical advisory organ which in turn is supplied with suitable instructions and plans. These advisory organs would be patronized regularly by professional planning firms.

Here then we have a question of weighty national significance waiting to be solved.

The plans for allotting space to houses should be coordinated with the strongly related plan (which is an organic part of the first) for creating public utilities. Individuals who are to be responsible should be named, deadlines should be set, financial support designated -- all this in the interest of creating public works. However if we want to be consistent, we must provide for the not less important question of the maintainance and professional use of the public works and also for the expenses which go with it.

We hope that this method of constructing dwellings which shows good beginnings along the lines of above ground building, will not suffer as a result of the lateness of instructions on a national scale or remain in the initial stages a thing which unfortunately has been experienced with similar projects; it is hoped that, instead, it will serve as an engineering accomplishment for the improvement and increased comfort of the dwellings of the workers.

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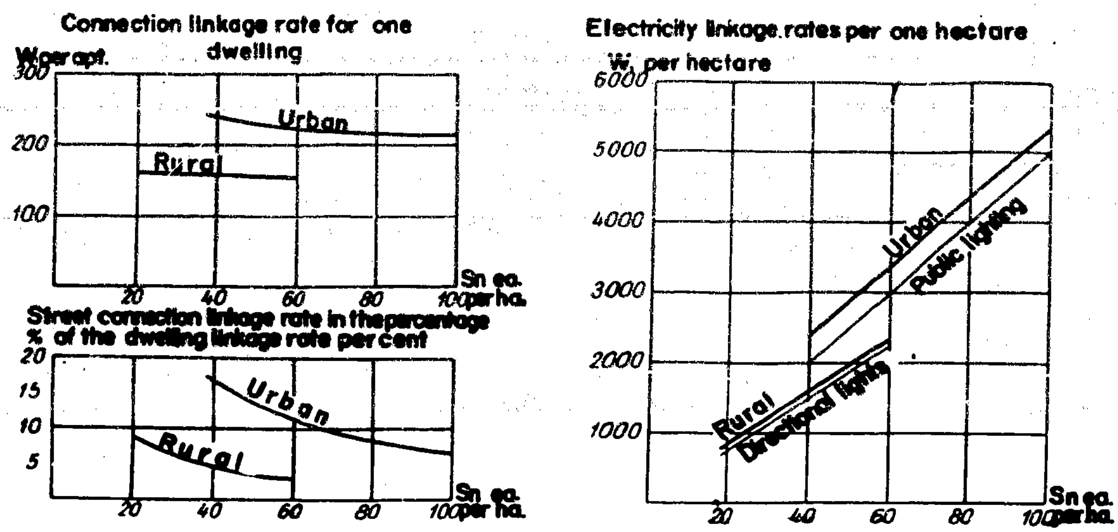

FIGURE

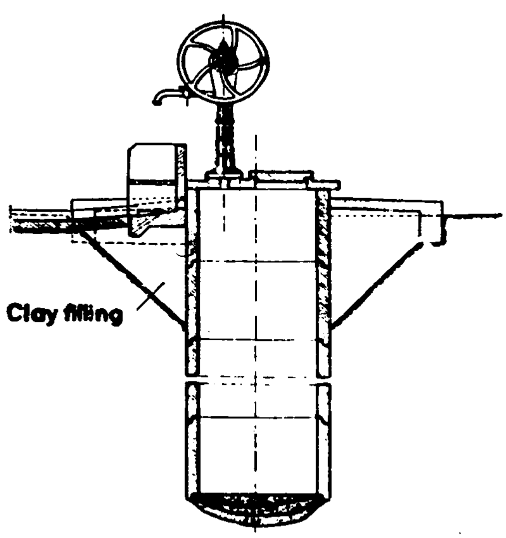

Figure 2. Suction shaft well.

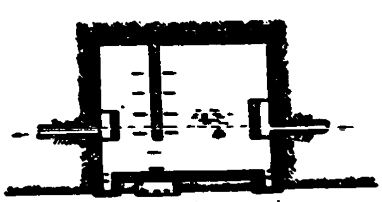

Figure 3. Septic tank for one to 64 persons.

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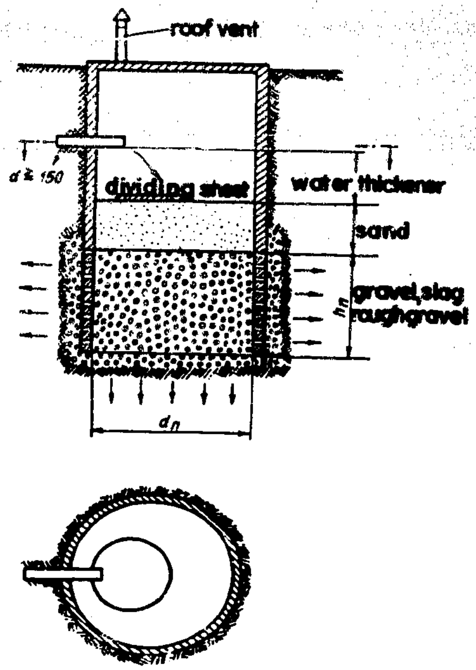

Figure 4. Drying well.

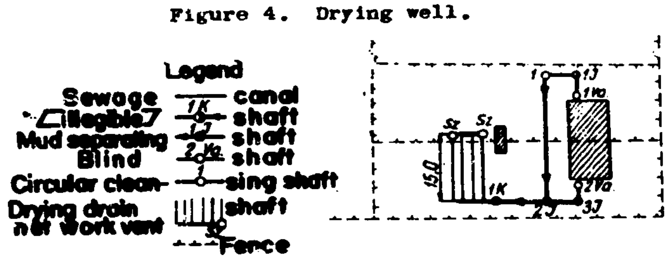

Figure 5. Drawing of underground irrigation.

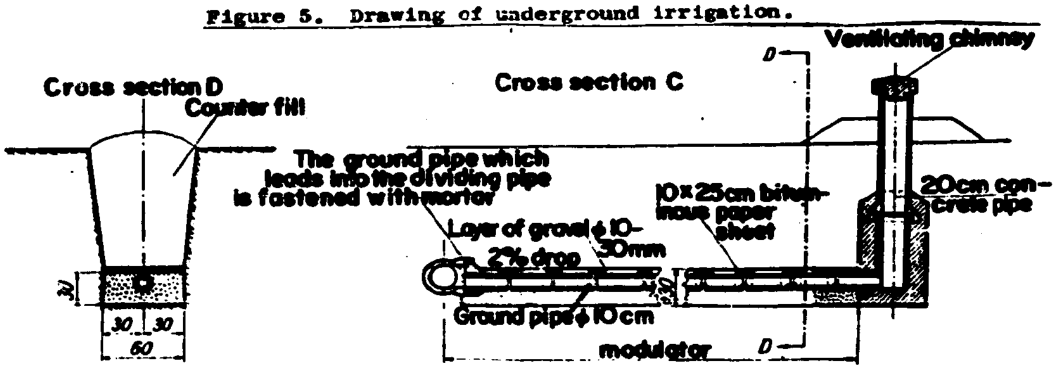

Figure 6. Details of drainage system.

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